



## Valorization of non-timber forest products in Mayo-Rey (North Cameroon)

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### ABSTRACT

Objective: Studies were conducted to characterize the Non-Timber Forest Products (NTFPs) from the locality of Mayo-Rey in the North Region of Cameroon for their subsequent domestication.

*Methodology and Results:* An ethnobotanical survey was conducted among 200 people drawn from four ethnic groups (Laka, Lamé, Peulh and Toupouri). This study has identified 107 plant species including 54 species food (vegetables, fruits and traditional drinks). The species *Dioscorea bulbifera*, *Burnatia* sp., *Parkia biglobosa*, *Detarium microcarpum*, *Adansonia digitata*, *Vitellaria paradoxa*, *Ziziphus mauritiana*, *Ximenia americana* and *Vitex doniana* were identified as major species of this town, due to their socio-economic importance. Plant parts used in the diet are descending fruits (53.70%), seeds (25.92%), leaves (22.22%), tubers (16.66%), the flowers (3.70%) and other (3.7%). Analyses on food uses indicates that 40 respondents use them as recipes involve fruits and 11 use them to prepare sauce. Three (3) species are commonly used for the preparation of pap, 8 species for the preparation of cuscus and 3 species for the preparation drink.

*Conclusion and application of results:* The exploitation of these species remains traditional, sometimes leading to overexploitation of the resource and therefore a loss of biodiversity. For sustainable management of these resources, domestication of preferred species could be considered.

**Keywords:** NTFP, Biodiversity, Domestication, Mayo-Rey.

### INTRODUCTION

Agricultural production in tropical Africa in general and Cameroon in particular is based on the shifting cultivation system otherwise referred to as Swidden short term (3-6 years) and a long period of rest (fallow) (Stéphanie, 1999). During the last decade, the use of natural resources in North region of Cameroon has become increasingly intensive with population growth and climate change (ICRAF,

1994). This has led a growing demand for food while land productivity declined (World Bank, 1984; 2002). The environment is negatively affected (Tchotsoua et al., 1998; Tchotsoua and Mapongmetsem, 2009). Faced with this problem, people make use of Non-Timber Forest Products (NTFPs) like *Dioscorea bulbifera*, *Tacca leontopetaloides*, *Oryza barthii*, *Detarium microcarpum*, *Ziziphus mauritiana*, to fill

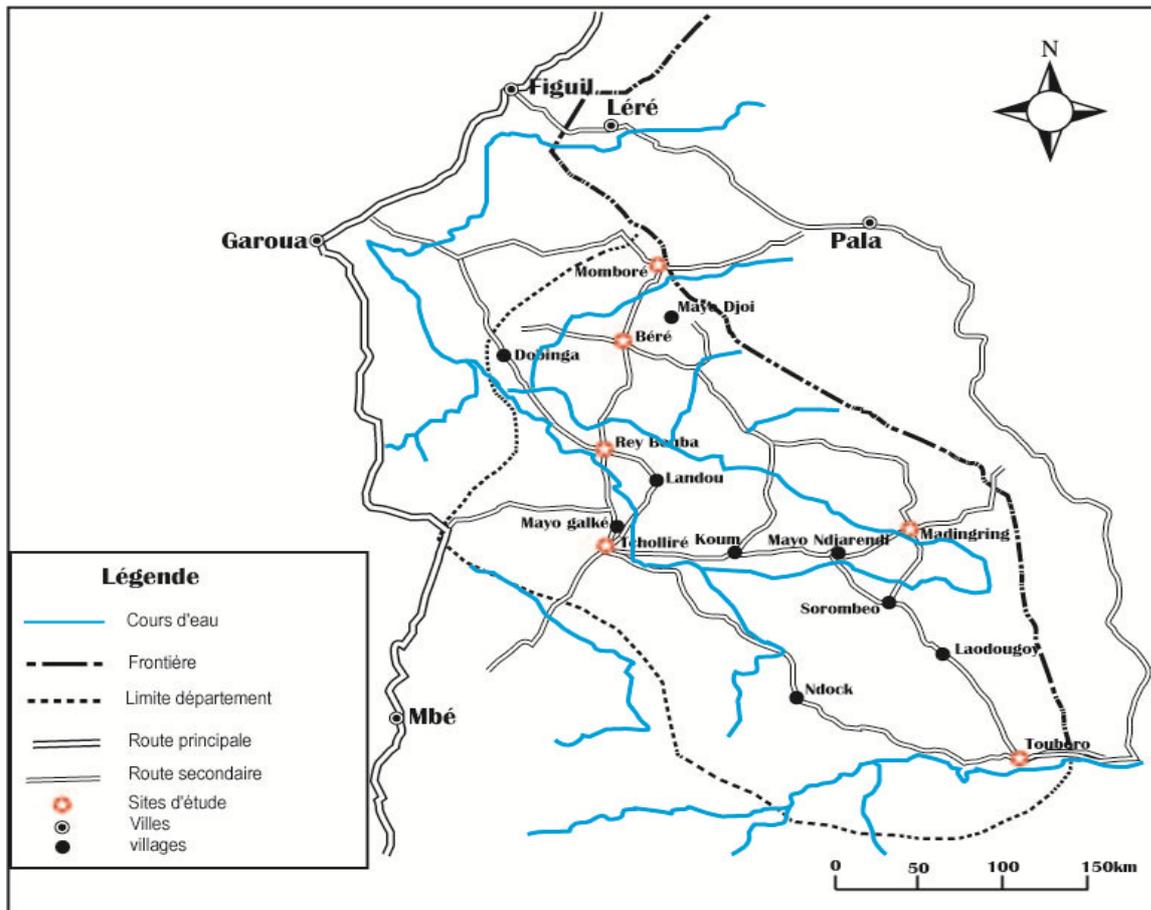
the deficit in agricultural products and diversify their income (Larwanou *et al.*, 2012). NTFP allow them to vary their diet and improve their standard of living (Hadji Sene, 1994; Tieguhong *et al.*, 2008; Noubissie *et al.*, 2008; Tieguhong and Zwolinski, 2009; Ingram *et al.*, 2010; Mapongmetsem *et al.*, 2010; Tieguhong *et al.*, 2012). In order to protect certain species of socio-economic interest, it would be necessary to introduce farmers' backgrounds of new production systems to increase agricultural production and protect natural ecosystems. Indeed, the rational management of the environment is increasingly advocated to mitigate the current and future challenges. Agroforestry appears as one of the alternatives that can overcome these problems. One of its functions is the diversification of food production and income (Godoy and Bawa 1993; Ambrose-Oji, 2003; Tieguhong and Zwolinski, 2009; Ingram *et al.*, 2010; Mapongmetsem *et al.*, 2010; Tieguhong *et al.*, 2012). Trees are the main component of agroforestry system. To further attract the interest from farmers, the introduction of trees of socioeconomic interest is an asset. Plants of interest are used for multiple purposes: food, medicine, energy, fertilizer and indispensable materials to manufacture populations commonly used tools (Christoph, 2002; Lamien and Traoré, 2002; FAO, 2003; Kouyaté *et al.*, 2006; Bikouel

## MATERIAL AND METHODS

This study was conducted between March and August 2009 in the Mayo-Rey localities: Tcholliré, Rey-Bouba, Mayo-Glaké, Madingring and Touboro. Mayo-Rey Division is in the Northern Region of Cameroon. The study area is located between latitudes 08°24' and 08°36' North and between longitudes 14°10' and 14°24' East of the Greenwich Meridian at an average altitude of 400 m above sea level. Benue Division, to the North East, bound it to the North in the South by the Adamawa Region and East by the Central African Republic (Fig.1). The climate is tropical with an average rainfall of 1000 mm to 1250 mm / year. The soil is sandy throughout the resort but in the plain of Mayo-Rey, alluvial soils are rich (Anonymous, 2007). The choice of locations is focused on three criteria: the presence of large market, ethnicity and extent of the

and Essomba, 2006; Tchatat and Ndoye, 2006; Fasoyiro and Degoke, 2007; Bassene, 2008; Lacombe and Aronson, 2008; FAO *et al.*, 2012). People usually have more than subsistence income from the forest (Sene, 2001; Vedeld *et al.*, 2007; Paumgarten, 2007; Tieguhong *et al.*, 2009). Moreover, the traditional abusive and uncontrolled exploitation of these resources affects their regeneration possibilities and can lead to their exhaustion (Kouyaté *et al.*, 2006). In northern Cameroon, despite the unlimited demand for products justified by the increase in population (Tchingsabe, 2009; Mapongmetsem *et al.*, 2010). Little information is available on domestic, nutritional intake, contribution to the welfare and socio-economic potential of NTFPs (Mapongmetsem *et al.*, 2008). This study was undertaken with a view to contribute to the knowledge gap in the role plants play on environmental sustainability and the contribution of NTFPs as food and drinks as well as alleviating rural poverty. The inventory of non-timber forest products in Mayo-Rey will develop appropriate strategies for their recovery and release their exploitation from informal. This work aims to characterize NTFP in the region for subsequent domestication. The following specific objectives have been assigned to this work: (1) identify the domestic and commercial use; (2) develop the type of NTFP in the region; (3) identify and analyse the major NTFPs of Mayo-Rey.

exploitation of NTFPs. The data collection method was based on structured interviews conducted in households and markets through previously developed questionnaires. Herbarium developed from samples collected was used to determine the scientific names of species. The survey was based on a sample of 50 people per village, 200 people interviewed in the Division. This sampling covered approximately 40.5% of the population over 18 years of the places visited. The classification method was based on the preference of each party. He attributed the number of points to species he preferred the most. Once the order of preference was indicated, a species list was submitted to respondents for checking compliance of their choice. Descriptive statistics were used to analyze the collected information.



Source: Carte routière de l'Afrique, Microsoft (R)Encarta (R), 2009

Réalisation: Homgué Tolbert, 2009

Figure 1: Locations of study area in Mayo-Rey Division.

## RESULTS

Like most rural populations in developing countries, the people of Mayo-Rey feed, treat and provide income through the many forest products. Food species Ethnobotanical surveys reveal the existence of many food species. Ninety-five (95 %) of the people interviewed confirms these results. A total of 54 species that are consumed by the population was listed (Table 1). These species are distributed in 40 genera and 26 families. They are involved in several food recipes. Plant parts used in the diet are descending fruits (53.70%), seeds (25.92%), leaves (22.22%), tubers (16.66%), the flowers (3.70%) and others (3.7%). Analyses of food uses indicate that 40 respondents use them as recipes involve fruits and 11 use them to prepare sauce. Three (3) species are commonly used for the preparation of the pap, 8 species for the preparation of cuscus and 3 species for the preparation drink.

**The most popular food species:** people for food (Table 2) use several species. The major species are

appreciated by farmers for their socio-economic values are:

*Vitellaria paradoxa*, which is a popular fuel by local people, its ripe fruits, is consumed during fieldwork. Shea butter extracted from its almonds is a very important source of fat for cooking. Traditional extraction of shea butter is a women's activity (especially older women).

*Dioscorea bulbifera* is much consumed by the people of the locality of Madinring. The tubers are prepared with sheets *Piliostigma thonningui* to remove the bitter taste before consumption. The tubers are eaten much during the lean period. Women are more involved in the exploitation of this species.

*Adansonia digitata* is most popular for its leaves in the town of Mayo-Rey. These fall in the preparation of the traditional sauce that accompanies the cuscus corn, sorghum, rice, millet. These leaves are eaten in the cool and dry forms. In the dry form, the leaves are dried and powdered before use and conservation. The white fruit

pulp can be sucked but diluted in water, it gives a sweet drink. This pulp is used by women for the preparation of the slurry. The leaves of desert date are consumed fresh and dry by the local people of Mayo-Rey as a sauce and as a traditional salad. The boiled seeds of this species are eaten as amuse gueule.

*Borassus aethiopum*: The fruits are consumed in mature and immature. The endosperm jelly of the fruit is also used to proclaim the hunger and thirst of the shepherds. The pulp of ripe fruit is eaten raw and during the lean period. The hypocotyl of seedlings or "bassi" in the local language is well known to all the people of Mayo-Rey for its food value and aphrodisiac. The leaves of *Senna tora* are consumed both fresh and dried forms. Fresh or dried leaves seasoned with peanut paste accompany cuscus. The manufacturing process of the flour *Tacca leontopetaloides* pass through several stages: buffing, pressing, filtering and recovering the supernatant until the disappearance of the bitter taste. White flour obtained at the end of the process is mixed with peanut paste for the preparation of traditional cakes or "Amankou" in local language. This flour is also used by women for preparing porridge and donuts.

The fruits of *Ziziphus mauritiana* are consumed fresh or dry as amuse gueule. The pulp of the seeds, powdered by women is mixed with peanut paste and kept waiting for the lean season. This dish is consumed during the fieldwork and the return of fields.

*Tamarindus indica* is a species highly prized by local people. The dissolution of fruit in water gives a sour drink. Women use for the preparation of the slurry.

**Food values economic potentiality:** Interviewed operators report that NTFPs harvesting are a source of income throughout the year as cash crops are mostly seasonal...and require a significant cost for labor of interview. Women and children are involved in the marketing of these products. NTFPs are sold in local markets. Traders are unanimous in that the means are insufficient for the purchase of inputs to increase agricultural productivity, which drives men to look more and more important to the economic value NTFPs. The leaves of *Adansonia digitata* are harvested in the natural stand, feet found in plantations, fields and Sares. These dried or processed powdered leaves are the subject of marketing channels villages to urban centres (Tcholliré, Toubouro, Madinring, Garoua, Yaoundé), and even cross the borders of Cameroon. The fruits are harvested from November. Fruit *Vitellaria paradoxa* and *Detarium microcarpum* have significant monetary value for children and women. They are sold in local markets. Shea butter extracts almonds *Vitellaria paradoxa* also a good

monetary value on the market. The seeds are stored during the harvest season and the butter extraction extends throughout the dry season. This activity generates annual revenues ranging between 2,000 and 250,000 FCFA for small producers and 50,000 FCFA 300,000 to FCFA for large producers. The majority of the women interviewed agreed on the fact that the marketing of shea butter provides them with the resources to pay school fees for their children.

The pulp *Hibiscus sabdarifa* harvested in plantations is dried and sold in local markets and in the subregion. The pulp in the manufacture of a natural sweet drink ("hoyoro" in local language) that is highly prized by consumers. The annual revenues range from FCFA 60,000 to FCFA 200,000 per producer.

*Parkia biglobosa* fruit are eaten raw in the far north of Cameroon. Fermented seeds can also be packaged into small balls or "Dadawa" in local language. They are sold in local markets in the region and are used as a spice. The "Dadawa" has been a very active marketing system in general and in local markets in particular region. Socio-economic surveys the fall and comments from industry stakeholders confirm that *Tamarindus indica*, *Ximenia americana*, *Ziziphus mauritiana* fruit are frequently encountered in the local markets of the Mayo-Rey. The annual revenue from their sales varies from 15,000 to 140,000 FCFA. The dried leaves of the herb *Senna tora* are frequently sold on local markets. Yearly income from their sale range from FCFA 13,000 to FCFA 32,000. The products from the tubers of *Tacca leontopetaloides* and *Dioscorea bulbifera* are sold in local markets. The annual revenue from the sale range from FCFA 30,000 to FCFA 150,000 per farmer. Dejong et al. (2000) believe that the economic value of NTFPs can promote the conservation of biodiversity, contributed to the maintenance of resources and socio-economic development on a sustainable basis.

**Constraint the operation of food species in the Mayo-Rey:** The majority of food plants are operated in a free manner. However, a minority part of an appropriation and operated by the only landowner. These are *Parkia biglobosa*, *Vitellaria paradoxa*, *Tamarindus indica*, *Borassus aethiopum*. These species are deliberately protected by the operators in their concessions or "Sare" and their fields. The stems of some food plants are declining in the localities of Mayo-Rey. The most cited species by operators are *Parkia biglobosa*, *Vitellaria paradoxa*, *Tamarindus indica*, *Borassus aethiopum*, *Tacca leontopetaloides*, *Dioscorea bulbifera*, *Burnatia* sp. and *Detarium microcarpum*. The causes of this decline are the abuse of NTFPs and timber, lack of regeneration

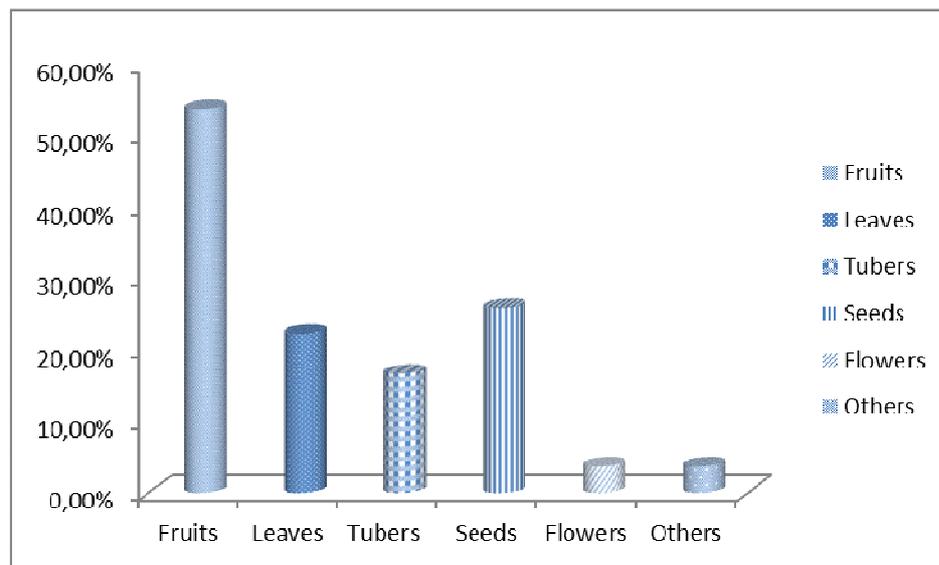
and insufficient rains. In addition to the reduction of species, the means of transport is a limiting factor valuation of NTFPs towns of Mayo-Rey. The localities of Mayo-Rey are landlocked; transport vehicles are only available on market day. Operators face many problems

to sell certain products to regional markets of Cameroon because of their perishable nature and harassment by agents of the Ministry of Forestry and Wildlife. Selfishness retailers wholesalers often hinder the exploitation of NTFPs in Mayo-Rey localities.

**DISCUSSION**

In communities of Mayo-Rey, NTFPs play an important role in socio-economic life of local people. They offer many products and services that are used by the population (FAO, 1998; 1999b; 2001a; 2002 Mbala and Walter, 2006). Their importance is vital in areas where they are a source of food and feed (Kouyaté *et al.*, 2006). At the end of this study, several food species have been recorded. They are a source and an important reservoir of NTFPs in Mayo-Rey. The plants that bear edible NTFPs are subject to abuse by the operators. They offer leaves, fruits, tubers, roots and hypocotyl that are regularly harvested and consumed or sold on local markets. Knowledge of edible species and exploitation of NTFPs is

important for operators whose economy is based on the harvesting and marketing of NTFPs (Niéyidouba and San Torre, 2002; Sene, 2001; Mapongmesem *et al.*, 2010). The majority of wild fruits, tubers and leafy vegetables enter the feed end of the dry season and during the rainy season. This interval corresponds to the lean period in rural areas. Most of the leaf development stage begins in April-May, just before the first rains. We can say that the periods of availability of edible NTFPs by local people is a relief that match the lean periods in households (Aïchatou, 2009). NTFPs are considered the last resort for local people.



**Figure 2:** parts of the most used in the diet of local populations plants

Ethnobotanical surveys reveal the existence of many food species. Ninty five (95 %) of the people interviewed confirms these results

**Table 1:** Parts of plants used by species and the local people of Mayo-Rey

| Species                         | Used Parts | Periods of Pickings | Way of Consuming | Products Purpose |
|---------------------------------|------------|---------------------|------------------|------------------|
| <i>Adansonia digitata</i>       | Fe, Fr     | seasonal            | Pap, Sau, Dri    | Auto, sale       |
| <i>Annona senegalensis</i>      | Fr         | seasonal            | Con              | Auto, sale       |
| <i>Balanites aegyptiaca</i>     | Fe, Fr, Se | seasonal            | Sau, Pap, Con    | Auto, sale       |
| <i>Borassus aethiopicum</i>     | Fr, Hy     | all year            | Con, Pap         | Auto, sale       |
| <i>Bridellia ferruginea</i>     | Fr         | seasonal            | Con              | Auto             |
| <i>Chromolaena</i> spp.         | Fe         | seasonal            | Sau              | Auto, sale       |
| <i>Detarium microcarpum</i>     | Fr         | seasonal            | Con              | Auto, sale       |
| <i>Diospyros mespiliformis</i>  | Fr         | seasonal            | Con              | Auto             |
| <i>Ficus</i> spp.               | Fr         | seasonal            | Con              | Auto             |
| <i>Ficus sycomorus</i>          | Fr         | seasonal            | Con              | Auto             |
| <i>Ficus valis choudae</i>      | Fr         | seasonal            | Con              | Auto             |
| <i>Grewia bicolor.</i>          | Fr, Te     | seasonal            | Con, Sau         | Auto, sale       |
| <i>Hyphaene thebaeca</i>        | Fr         | seasonal            | Con              | Auto, sale       |
| <i>Lannea schimperi</i>         | Fr         | seasonal            | Con              | Auto             |
| <i>Nauclea latifolia</i>        | Fr         | seasonal            | Con              | Auto             |
| <i>Parinari curatillifolia</i>  | Fr         | seasonal            | Con              | Auto             |
| <i>Parkia biglobosa</i>         | Fr, Se     | seasonal            | Con, Sau         | Auto, sale       |
| <i>Sclerocarya birrea</i>       | Fr, Se     | seasonal            | Con              | Auto, sale       |
| <i>Syzygium macrocarpum</i>     | Fr         | seasonal            | Con              | Auto             |
| <i>Tamarindus indica</i>        | Fr, Fe     | seasonal            | Con, Dri, Sau    | Auto, sale       |
| <i>Vitellaria paradoxa</i>      | Fr, Se     | seasonal            | Con, Sau         | Auto, sale       |
| <i>Vitex doniana</i>            | Fr         | seasonal            | Con, Dri         | Auto, sale       |
| <i>Vitex madienis</i>           | Fr         | seasonal            | Con, Dri         | Auto, sale       |
| <i>Ximenia americana</i>        | Fr         | seasonal            | Con, Dri         | Auto, sale       |
| <i>Ziziphus mauritiana</i>      | Fr         | seasonal            | Con              | Auto, sale       |
| <i>Bixa orellana</i>            | Se         | seasonal            | Sau              | Auto, sale       |
| <i>Bombax costatum</i>          | Fl         | seasonal            | Sau              | Auto, sale       |
| <i>Piliostigma thonningii</i>   | Fr         | seasonal            | Sau              | Auto, sale       |
| <i>Sesamum indicum</i>          | Fe         | seasonal            | Sau              | Auto, sale       |
| <i>Hibiscus sabdariffa</i>      | Fe, Fr     | seasonal            | Sau, Dri         | Auto, sale       |
| <i>Ricinus communis</i>         | Se         | seasonal            | Sau              | Auto             |
| <i>Moringa oleifera</i>         | Se, Fr     | seasonal            | Sau, con         | Auto, sale       |
| <i>Discorea bulbifera</i>       | Tr         | all year            | Pap              | Auto, sale       |
| <i>Discorea</i> spp.            | Tr         | all year            | Pap              | Auto, sale       |
| <i>Tacca leontopetaloides</i>   | Tr         | all year            | Boi, Fu          | Auto, sale       |
| <i>Nephtytis</i> sp.            | Tr         | seasonal            | Con              | Auto             |
| <i>Lannea acida</i>             | Fr, Tr     | seasonal            | Con,             | Auto             |
| <i>Senna tora</i>               | Fe         | seasonal            | Sau              | Auto, sale       |
| <i>Senna occidentalis</i>       | Se         | seasonal            | Dri              | Auto             |
| <i>Grewia</i> spp.              | Fr         | seasonal            | Con              | Auto             |
| <i>Ficus polita</i>             | Fr         | seasonal            | Con              | Auto             |
| <i>Cleome coeruleorosea</i>     | Fe         | seasonal            | Sau              | Auto, sale       |
| <i>Cochospermum planchonii</i>  | Tr         | seasonal            | Con              | Auto             |
| <i>Citrullus lanatus</i>        | Fe,        | seasonal            | Sau              | Auto, sale       |
| <i>Burnatia</i> sp.             | Tr         | seasonal            | Dri              | Auto             |
| <i>Bridelia ferruginea</i>      | Fr         | seasonal            | Con              | Auto             |
| <i>Amaranthus</i> sp.           | Fe         | seasonal            | Sau              | Auto             |
| <i>Haemastotaphis barteri</i>   | Fr         | seasonal            | Con, Dri         | Auto             |
| <i>Daweji</i> (Ffulde)          | Tr         | all year            | Con              | Auto             |
| <i>Leptadenia hastata</i>       | Fe         | all year            | Sau, Con         | Auto             |
| <i>Sinsenii</i> (Ffulde)        | Te         | all year            | Dri              | Auto             |
| <i>Dactyloctenium aegyptium</i> | Se         | seasonal            | Cu               | Auto             |
| <i>Oryza barthii</i>            | Se         | seasonal            | Cu               | Auto             |
| <i>Setaria pumila</i>           | Se         | seasonal            | Cu               | Auto             |

Auto : Autoconsumption ; sale : marketable; Con : direct consumption of the fruits or grains ; Sau : Preparation of the sauce ; Pap : Preparation of the pap ; Dri : Preparation of drinks ; Cu : Preparation of cuscus ; Fr : Fruit ; Fe : leaf ; Tr : Tuber ; Fl : Flower; Se : seed ; Hy : Hypocotyle.

**Table 2:** Frequency of food plants of Mayo-Rey (%)

| Species                         | Laka         | Lamé         | Peuhl        | Toupouri     | Average      |
|---------------------------------|--------------|--------------|--------------|--------------|--------------|
| <i>Adansonia digitata</i>       | 48           | 64           | 76           | 60           | 62,0         |
| <i>Annona senegalensis</i>      | 56           | 68           | 52           | 74           | 62,5         |
| <i>Balanites aegyptiaca</i>     | 6            | 48           | 14           | 6            | 18,5         |
| <i>Borassus aethiopum</i>       | 0            | 36           | 24           | 0            | 15,0         |
| <i>Bridellia ferruginea</i>     | 12           | 4            | 24           | 10           | 12,0         |
| <i>Chromolaena</i> spp.         | 0            | 72           | 0            | 0            | 18,0         |
| <i>Detarium microcarpum</i>     | 42           | 64           | 62           | 60           | 57,0         |
| <i>Diospyros mespiliformis</i>  | 30           | 72           | 68           | 60           | 57,5         |
| <i>Ficus</i> spp.               | 12           | 18           | 16           | 20           | 16,5         |
| <i>Ficus sycomorus</i>          | 10           | 62           | 22           | 26           | 30,0         |
| <i>Ficus valis choudae</i>      | 24           | 56           | 68           | 60           | 52,0         |
| <i>Grewia bicolor</i>           | 70           | 46           | 56           | 48           | 55,0         |
| <i>Hyphaene thebaeca</i>        | 12           | 44           | 42           | 14           | 25,5         |
| <i>Lannea schimperi</i>         | 26           | 28           | 12           | 8            | 18,5         |
| <i>Nauclea latifolia</i>        | 32           | 26           | 20           | 28           | 26,5         |
| <i>Parinari curatillifolia</i>  | 30           | 8            | 10           | 0            | 12,0         |
| <i>Parkia biglobosa</i>         | 84           | 40           | 0            | 0            | 17,5         |
| <i>Sclerocarya birrea</i>       | 0            | 76           | 64           | 52           | 48,0         |
| <i>Syzygium macrocarpum</i>     | 30           | 8            | 8            | 16           | 15,5         |
| <i>Tamarindus indica</i>        | 36           | 72           | 92           | 64           | 66,0         |
| <i>Vitellaria paradoxa</i>      | 92           | 74           | 80           | 68           | 78,5         |
| <i>Vitex doniana</i>            | 52           | 76           | 60           | 72           | 65,0         |
| <i>Vitex madienis</i>           | 16           | 50           | 18           | 20           | 26,0         |
| <i>Ximenia americana</i>        | 50           | 62           | 64           | 56           | 58,0         |
| <i>Ziziphus mauritiana</i>      | 24           | 60           | 48           | 32           | 41,0         |
| <i>Bixa orellana</i>            | 22           | 30           | 64           | 28           | 36,0         |
| <i>Bombax costatum</i>          | 20           | 40           | 28           | 30           | 29,5         |
| <i>Piliostigma thonningii</i>   | 40           | 82           | 84           | 88           | 64,5         |
| <i>Sesamum indicum</i>          | 12           | 48           | 86           | 52           | 49,5         |
| <i>Hibiscus sabdariffa</i>      | 52           | 76           | 60           | 72           | 65,0         |
| <i>Ricinus communis</i>         | 0            | 0            | 0            | 40           | 10,0         |
| <i>Moringa oleifera</i>         | 10           | 0            | 0            | 0            | 2,5          |
| <i>Discorea bulbifera</i>       | 96           | 64           | 40           | 10           | 52,5         |
| <i>Discorea</i> spp.            | 82           | 83           | 52           | 71           | 72,0         |
| <i>Tacca leontopetaloides</i>   | 10           | 65           | 31           | 20           | 31,5         |
| <i>Nephtytis</i> sp.            | 0            | 20           | 15           | 25           | 15,0         |
| <i>Lannea acida</i>             | 5            | 16           | 18           | 20           | 13,6         |
| <i>Senna tora</i>               | 35           | 86           | 89           | 70           | 70,0         |
| <i>Senna occidentalis</i>       | 40           | 30           | 56           | 39           | 41,2         |
| <i>Grewia</i> spp.              | 80           | 15           | 27           | 25           | 36,7         |
| <i>Ficus polita</i>             | 15           | 10           | 9            | 7            | 10,2         |
| <i>Cleome coeruleorosea</i>     | 0            | 70           | 60           | 0            | 32,5         |
| <i>Cochospermum planchonii</i>  | 30           | 25           | 10           | 0            | 16,2         |
| <i>Citrullus lanatus</i>        | 0            | 17           | 14           | 0            | 7,7          |
| <i>Burnatia</i> sp.             | 0            | 0            | 50           | 0            | 12,5         |
| <i>Bridellia ferruginea</i>     | 12           | 30           | 28           | 26           | 24,0         |
| <i>Amaranthus</i> sp.           | 10           | 60           | 25           | 0            | 23,7         |
| <i>Haemastotaphis barteri</i>   | 0            | 15           | 55           | 12           | 20,5         |
| <i>Daweji</i> (Ffulde)          | 25           | 46           | 57           | 62           | 47,5         |
| <i>Leptadenia hastata</i>       | 0            | 12           | 0            | 0            | 3,0          |
| <i>Sinseni</i> (Ffulde)         | 0            | 0            | 20           | 0            | 5,0          |
| <i>Dactyloctenium aegyptium</i> | 13           | 25           | 40           | 0            | 19,5         |
| <i>Oryza barthii</i>            | 15           | 36           | 25           | 26           | 25,5         |
| <i>Setaria pumila</i>           | 0            | 9            | 16           | 7            | 8,0          |
| <b>Average</b>                  | <b>26,44</b> | <b>41,55</b> | <b>38,13</b> | <b>29,40</b> | <b>33,32</b> |

## CONCLUSION

The study of Non Timber Forest Product identified 107 plant species 54 of which has food values value (vegetables, fruits, tubers, traditional drinks) were counted. The picking fruits, leaves and harvest the tubers of these species occupy an important place in the lives of local people, both during the sufficiency period and that of food shortage. NTFPs are used for auto consumption. They are sold on the market by women and children; these provide them substantial incomes that allow them to meet their basic needs. Efforts should be provided on the

domestication of major species at high socio-economic value to improve their production in agroforestry systems. Models of sustainable exploitation and the valorization of multi-purpose tree species should be encouraged to reduce the risk of food insecurity and the degradation of biodiversity in the Mayo-Rey. It would encourage operators to bring their plantations major food species. Research on the nutritional value of consumed parts should be conducted in the future.

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